

Abigail Jones & Iwan Temblett

LAND OFF GRAIG ROAD, GELLINUDD

Intrusive Coal Mining Risk Assessment Report

14519/RH/25/MRA

CLIENT: Abigail Jones & Iwan Temblett

PROJECT: Land off Graig Road, Gellinudd

TITLE: Intrusive Mining Risk Assessment Report

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1.0 INTRODUCTION

1.1 GENERAL

Abigail Jones and Iwan Temblett are proposing the development of a site on Graig Road, Gellinudd, for residential use. The location of the site is shown in Figure 1.

A previous Coal Mining Risk Assessment desk study report was prepared for the site by TFW Group Limited on behalf of Abigail Jones and Iwan Temblett. Reference should be made to this report, referenced Coal Mining Risk Assessment Report, 14082024-24-364, dated August 2024 (see Appendix A). This report covered the current development site and a larger area to the south of the development area.

The above Coal Mining Risk Assessment desk study report identified a potential risk from unrecorded coal workings at shallow depth and recommended that intrusive investigations were carried out to assess the potential risk.

Intégral Géotechnique (Wales) Limited were appointed as the Geotechnical Engineers to undertake an intrusive mining investigation to determine the underlying geology beneath the site and whether any shallow mining features exist.

This report presents the findings of the site investigation and provides an assessment on the potential risk from past mining beneath the site, including consideration for mine gas emissions.

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1.2 PROPOSED DEVELOPMENT

The proposed development will comprise a single 'L'-shaped house with a private driveway and garden.

The proposed development layout is shown in Figure 2.

1.3 SCOPE OF WORKS

A Coal Mining Risk Assessment Report for the site was previously prepared for the site by TFW Group Limited.

Based on the Coal Mining Risk Assessment findings, a site investigation was designed and undertaken by Intégral Géotechnique (Wales) Limited.

The investigation was planned in accordance with BS 5930:2015+A1:2020 — Code of Practice for Ground Investigations and the requirements of the Mining Remediation Authority.

The scope of the site investigation comprised the drilling of 3 No. rotary open hole boreholes within the footprint of the proposed new house.

1.4 LIMITATIONS

This report has been prepared as a working document to inform further development discussions with relevant stakeholders, including the Local Planning Authority and the building control authority as appropriate.

It should be noted that vertical and lateral changes in ground conditions may be present between exploratory hole locations.

2.0 THE SITE

2.1 SITE LOCATION AND DESCRIPTION

The site is located south of Graig Road (A474), Gellinudd, at an approximate National Grid Reference of 273575, 204150, see Figure 1.

The site is irregular in shape and occupies an area of approximately 0.66 hectares.

At present the site comprises a vacant plot, recently cleared of scrub vegetation and trees. Several mature trees have been retained to the rear (south) of the site.

An existing wall, roughly 1m in height and in poor repair, along with heras fencing, form the northern boundary of the site. The western edge of the site is defined by a wall, and the eastern side of the site has been heras fenced. The southern edge of the site is unbound.

The site is generally fairly level in topography, although a ditch partially runs just within the western site boundary towards the back of the site.

A site plan is presented in Figure 2.

2.2 SITE OPERATIONS

At the time of the investigation the site was vacant and fenced off from Graig Road.

2.3 SURROUNDING LAND USE

Surrounding land use is residential.

2.4 AVAILABLE DESK STUDY DATA

The following section summarises the key findings and conclusions of the Coal Mining Risk Assessment desk study report prepared by TFW Group Limited (Report No. 14082024-24-364, dated August 2024). A copy of this report is included in Appendix A.

2.4.1 Site History

Review of historical Ordnance Survey mapping indicates that a single building resided in the east of the site in 1878 and a water course (following the route of the ditch recorded on site at the time of the site investigation works) located just inside the site's western boundary.

2.4 AVAILABLE DESK STUDY DATA (CONTINUED)

The water course directed northwards and was recorded to 'sink' beneath the north of the site. Between 1898 and 1918 two additional structures had been erected in the southern half of the site. The additional buildings had been demolished by 1942. The building in the east of the site was removed between 1974 and 1989 and the site has remained vacant since.

2.4.2 Geology

Geological mapping (Sheet SN70SW) indicates that the site is dissected by the north-south trending Duffryn Fault. This divides strata of the Hughes Member to the west from down-thrown strata of the Swansea Member to the east.

Both the Hughes Member and Swansea Member date to the Carboniferous Period, and belong to the Upper Coal Measures.

Sandstones of both the Swansea Member and Hughes Member are recorded to be the dominant strata. Swansea Member strata dip at approximately 15° towards the east-southeast. The Hughes Member strata are shown to dip more steeply, potentially from 25-30° southeast to 55° towards the east-northeast.

No superficial deposits are recorded to be present, but soil cover derived from weathered bedrock may be anticipated.

The outcrops of the Hughes coal seam and underlying Glyngwilym coal seam are recorded on the geological map approximately 130m and 165m to the west, respectively. Old levels are denoted along these seam outcrops. These seams may be expected to lie beneath the site at a depth of at least 60m.

The conjectural outcrop of the Graigola coal seam is recorded approximately 370m to the north of the site. Old levels are also recorded along this seam. The seam is shown to be truncated west of the site by the Dyffryn Fault, but it may still be anticipated to underlie the site.

In contrast the SN70SW sheet geological map, the Mining Remediation Authority and older Glamorgan VIII.SE sheet geological map place the Dyffryn Fault west of the site. The Mining Remediation Authority also record the outcrop of the Swansea No.3 seam (also known as the Graigola coal seam) 36m to the northwest of the site. Based on this outcrop position the Graigola coal seam would be expected to underlie the site at shallow depth.

2.4 AVAILABLE DESK STUDY DATA (CONTINUED)

2.4.3 Coal Mining

The Mining Remediation Authority place the site in a High Risk Development Area.

A Mining Remediation Authority Consultants Coal Mining Report obtained as part of the TFW Group Limited Coal Mining Risk Assessment desk study report states that the likelihood for probable unrecorded workings is “none”. However, this does not mean that shallow unrecorded workings do not exist, but rather any information to support this has not come into the possession of the Coal Authority.

Based on the outcrop location of the Graigola coal seam, as inferred by the Mining Remediation Authority, this seam is anticipated to lie at shallow depth beneath the site. This seam is typically found to be 1.4-1.8m in thickness.

The coal seam is deemed to be of workable thickness by the Mining Remediation Authority and is recorded to have been worked at outcrop in the surrounding area.

It has therefore been concluded that a potential risk from unrecorded mine workings in the Graigola coal seam may exist.

There is a recognised risk of ground instability due to historical shallow workings, particularly where the overlying rock thickness to void thickness (H/T) ratio is <10 , as discussed by Statham et al. (2006) in Subsidence Due to Abandoned Mining in the South Wales Coalfield.

To evaluate these risks, an intrusive investigation comprising a number of rotary boreholes was recommended.

No recorded mine entries are located on site or within influencing distance of the site.

2.4.4 Mine Gas

A preliminary mine gas risk assessment was conducted within the TFW Group Limited Coal Mining Risk Assessment Report in accordance with CL:AIRE Good Practice Guidance (October 2021).

This concluded that a potential high risk from mine gas existed should shallow unrecorded mine workings be detected beneath the site.

Further consideration of mine gas based on the findings of the intrusive ground investigation is provided within Section 5.2.

3.0 THE SITE INVESTIGATION

A site investigation was undertaken in November 2025, designed in accordance with BS 5930:2015+A1:2020 (Code of Practice for Ground Investigations) and the requirements of the Mining Remediation Authority.

The fieldworks comprised 3 No. rotary open-hole boreholes (referenced BH01 to BH03), drilled to a maximum of 36.50m below existing ground level using water flush methods.

The rotary boreholes were drilled to confirm the depth, thickness, and condition of underlying coal seams and bedrock geology, and to identify any evidence of historical mining.

The logs were prepared by the lead driller by examination of the drilling flush returns.

The works were supervised by a qualified Geotechnical Engineer from Intégral Géotechnique (Wales) Limited.

The approximate exploratory locations are shown in Figure 2.

The rotary borehole logs are presented in Appendix B.

4.0 GROUND CONDITIONS

4.1 GEOLOGY

The ground conditions across the site typically comprise a surface cover of made ground to approximate depths of between 0.6m and 0.7m below ground level (bgl), underlain by superficial soils to approximate depths of between 6.7m and 7.4m bgl, further underlain by strata of the Upper Coal Measures. The maximum depth of investigation ranged between 35.0m and 36.50m depth.

The made ground was found to consist of colliery spoil materials.

The superficial soils were described as boulder clay, to approximate depths of between 3.5m and 3.9m bgl, underlain by clayey gravel of sandstone to typically 6.7/7.4m depth.

The bedrock strata within BH01 was found to be dominated by mudstone, with intermittent sandstone bands, to the full investigation depth of 35.0m bgl. A single intact coal seam was encountered between approximately 14.1m and 15.3m depth (1.2m in thickness).

In contrast, the bedrock strata in boreholes BH02 and BH03 were initially found to comprise sandstone to approximately 13.2m and 12.9m depth, respectively, succeeded predominantly by mudstone with occasional sandstone horizons or sandstone bands to the full investigation depth of 35.0m and 36.50m bgl, respectively. A thin intact coal seam was encountered between approximately 10.6m and 10.7/10.8m depth (0.1m – 0.2m in thickness). A second intact coal seam, 0.9m in thickness, was identified at approximate depths of between 25.2m – 26.1m (BH02) and 26.7m – 27.6m (BH03).

Sporadic and inconsistent coal traces or bands were also noted within the sandstones and mudstones within boreholes BH02 and BH03.

The variation in the bedrock geology between borehole BH01 and boreholes BH02 and BH03 is likely to be associated with faulting in the area with the possible presence of a fault line passing centrally through the site in a north-south direction. This is likely to represent a local minor fault, positioned west of Dyffryn Fault as located by the Mining Remediation Authority and geological Glamorgan map sheet VIII.SE.

The 0.9m thick coal seam detected in boreholes BH02 and BH03 may be interpreted to be that of the Graigola coal seam. The coal seam encountered in borehole BH01 is likely to be a locally faulted section of the Graigola Coal Seam.

4.1 GEOLOGY (CONTINUED)

No evidence of any past mining activities, voids, backfilled mine workings, etc. were identified in the boreholes.

4.2 GROUNDWATER

Groundwater was encountered in boreholes BH02 and BH03 from 3.5m and 2.7m depth, respectively, to the full investigation depth.

Within borehole BH01, water strikes were recorded at 3.9m and 19.8m depth.

All groundwater observations reflect conditions at the time of the fieldwork and may vary due to seasonal or climatic effects.

5.0 COAL MINING RISK ASSESSMENT

5.1 UNDERGROUND SHALLOW MINE WORKINGS

The Coal Mining Risk Assessment desk study report prepared for the site by TFW Group Limited concluded that whilst the available information did not identify shallow recorded workings beneath the site, the Graigola coal seam (Swansea No.3 seam) is considered capable of having been historically worked at shallow depth, and the potential for unrecorded shallow underground workings could not be ruled out. This was based on the anticipated workable thickness of the seam, and recorded working of the seam in the surrounding area.

The site falls within an area designated as a High Risk Development Area by the Mining Remediation Authority in relation to the Graigola coal seam.

If old workings are present and remain untreated there is potential for void migration and surface subsidence to occur.

TFW Group Limited recommended that this risk was further assessed. To assess this risk, three rotary boreholes (BH01 to BH03) were drilled beneath the footprint of the proposed new residential dwelling.

Whilst shallow coal seams were encountered in the boreholes, the seams were intact with no evidence of shallow workings, voids, backfilled workings, etc..

In addition, a possible fault line was found to pass directly through the site, which means the localised ground conditions are generally likely to be disturbed or inconsistent and not conducive to being worked.

Based on these findings, there is not considered to be a risk from shallow unrecorded mine workings beneath the site.

5.2 MINE GAS

A mine gas risk assessment has been undertaken in accordance with the CL:AIRE (2021) Good Practice for Risk Assessment for Coal Mine Gas Emissions. This approach follows a source–pathway–receptor model, assessing the potential for gas generation, migration, and impact on future receptors.

Coal mine gas may be generated via several mechanisms, including:

5.2 MINE GAS (CONTINUED)

- Desorption of methane from residual coal seams,
- Oxidation of coal or pyritic minerals,
- Decomposition of timber supports,
- Chemical reactions involving mine water and carbonate-bearing strata.

For gas to present a risk to surface receptors, a viable migration pathway (e.g. mine entries, faults, fractured and unflooded bedrock) must exist.

The Mining Remediation Authority has stated that there are no known recorded mine workings beneath the site and no mine entries within 100m of the site boundary.

Several coal seams, a potential source of mine gas, were recorded at shallow depth beneath the site during the site investigation.

A possible fault line, a potential pathway for mine gas, was found to cross through the site.

However, the intrusive site investigation has confirmed that the shallow coal seams beneath the site remain intact with no evidence of any past shallow mining. In addition, significant groundwater was noted to be present beneath 3.5m to 3.9m depth, indicating saturated ground.

In line with the CL:AIRE (2021) guidance, no viable source of mine gas is therefore identified.

5.3 CONCLUSION

Based on the results of the intrusive mining investigation and the confirmed absence of shallow mine workings beneath the site, it can be concluded that no remedial or protective measures related to shallow mining risk are required.

APPENDIX A

TFW GROUP LIMITED COAL MINING RISK ASSESSMENT DESK STUDY REPORT



Coal Mining Risk Assessment Report

Site: Graig Road, Gellinudd, Rhos, Pontardawe.

Prepared For: Abigail Jones & Iwan Temblett

Issue Date: August 2024

Job No: CMRA-TF-24-364-CA

Abigail Jones & Iwan Temblett

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Proposed Single Residential Development,
Graig Road, Gellinudd.

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Executive Summary

Site Location and Proposed Development	The site is located off Graig Road, Gellinudd, Rhos, Pontardawe on an approximate National Grid Reference of 27358, 204096, occupying a plan area of approximately 0.64 Hectares. The site is currently unoccupied, covered by rough grassland and non-coniferous woods. A stream runs down the western edge of the site, flowing in a south to north direction. The site elevation is approximately 102 – 106m AOD and is generally sloping down towards the North.
Site History	The site has remained largely undeveloped, with the exception of some historical buildings in the far north of the site.
Geology	The site is shown to be underlain by sandstones of the Swansea Beds and Hughes Beds, which are segregated on site by a fault that crosses its far south-western corner. An unnamed seam outcrops beneath the far southeast of the site, and the underlying Swansea No.3 seam lies 36m to the northwest. Reference to the geological map informs that the No.3 Swansea seam is the Graigola coal.
Preliminary Coal Mining Risks	The No.3 Swansea/Graigola coal is noted by the Coal Authority to be of workable thickness. Based on the seam dip and distance from site quoted by the Coal Authority, the seam may be expected to lie at 18m depth on the north-western corner of the site, deepening towards the southeast. The geological map records that the Graigola seam has been worked from outcrop north of the site. Due to this historical evidence for working, the presence of unrecorded workings in the seam beneath the site cannot be ruled out. In order to prevent the collapse of old workings migrating to the surface and forming ‘crown holes’ there should be a rock head to void ratio of 10:1. Depending on the amount of rockhead cover above any workings the above criteria may not be satisfied. It is therefore recommended that a physical site investigation be performed on site to establish the geological conditions and presence and thickness of any coal seams and workings.
Mine Gas	Due to the position of the site in relation to the underlying Graigola coal seam, there is potential high risk of mine gas if this seam is found to have been worked. If workings are identified during an intrusive investigation, a detailed mine gas risk assessment would be required to establish whether suitable mitigation measures can be incorporated into the development.

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SECTION 1 Introduction and Proposed Development

1.1 Introduction

The Client has requested that a Coal Mining Risk Assessment Report be prepared for a proposed dwelling at land off Graig Road, Gellinudd, Rhos, Pontardawe. The proposed layout has not currently been provided.

Terra Firma has been commissioned by the Client to undertake a desk based Coal Mining Risk Assessment (CMRA) for the site.

The main objectives of the intrusive coal mining risk assessment were to:

- Assess the presence of any unrecorded mine workings at shallow depth
- Determine the presence or otherwise of any mine entries
- Provided recommendations for any necessary ground stabilisation

In order to achieve the above objectives, Terra Firma carried out an assessment programme including a desk study review of available map and Coal Authority data.

1.2 Limitations and Exceptions of Investigation

The Client has requested that a desk-based CMRA be undertaken to enable the outlined main objectives.

The CMRA was conducted, and this report has been prepared for the sole internal reliance of the Client and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geoenvironmental and geotechnical consultants. Terra Firma does not provide legal advice and the advice of lawyers may be required.

1.3 Quality Assurance

The quality and environmental aspects of the assessment and investigation comply with UKAS Accredited ISO 9001:2015 and ISO 14001:2015 standards.

SECTION 2 Review of Existing Data

2.1 Physical Setting and Current Site Use

The development site is irregular in shape and locates off Graig Road, Gellinudd. The site centres on an approximate National Grid Reference of 27370, 204090, occupying a plan area of approximately 0.64 Hectares.

The site elevation is approximately 102 – 106m AOD and is generally sloping down towards the north.

The site is currently unoccupied, covered by rough grassland and deciduous woods. A stream runs down the western edge of the site, flowing in a south to north direction. Residential buildings and gardens border the eastern edge of the site whilst the remaining boundaries are bordered by rough grassland.

The site location can be seen on **Figure 2.1**.

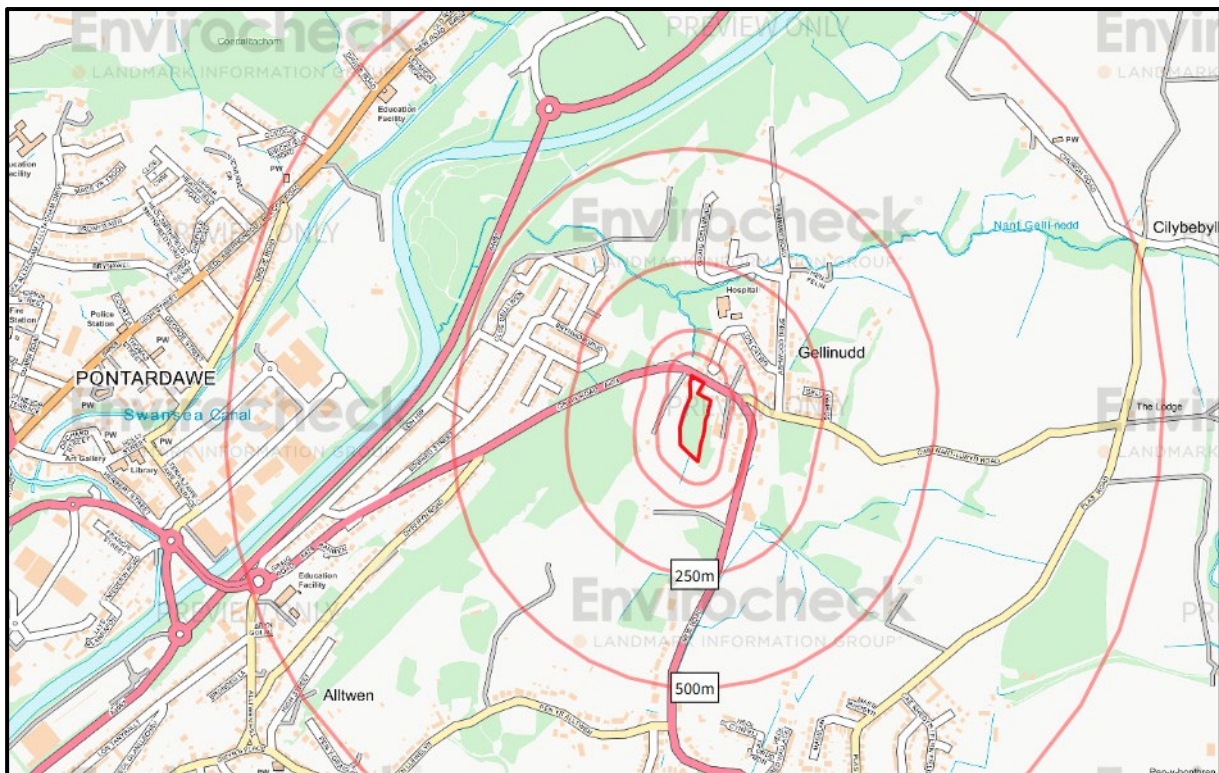


Figure 2.1 Site Location (Envirocheck, 2024)

2.2 Site History

Historical maps of the site have been obtained from Landmark Information Group. The history plans are supplied in **Annex A** of this report, and the most relevant editions are summarised in **Table 2.1** below. Distances, where quoted are approximate, and any changes in-between map editions may not be recorded.

Table 2.1 Historical Development from Map Information

Map Edition & Scale	Key Features on Site	Key Features off Site
1877-1878 (1:2,500)	The site comprises two fields, north and south, and a small portion in the north of the site is occupied by a house and garden. A tree-lined stream flows along the site's western boundary, continuing half way along the southern boundary of the site. A road runs along the northern edge of the site.	Cwm-Nant-Llwyd Colliery situates 220m to the east. Air shafts are also denoted 400m southeast and Located 150m west of the site is an 'Old Coal Level'. Field land and individual residential buildings surround the site at distances of 17m to 250m in all directions. A school situates directly east of the site.
1898-1899 (1:2,500)	The two fields on site have been combined into one field.	No significant change to surrounding area from previous edition.
1918-1919 (1:2,500)	Two buildings have been constructed in the for north of the site.	There is an old quarry located 90m to the northeast. A gravel pit is located 180m to the east of the site.
1921 (1:10,560)	No significant change to site from previous addition.	No significant change to surrounding area from previous edition.
1941-1942 (1:2,500)	Only one building remains in the far north of the site..	Some residential development has occurred in the area, to the east of the school. An isolation hospital has been established 130m to the north.
1953 (1:10,560)	No significant change to site from previous edition.	Cwm-Nant-Llwyd Colliery and surrounding coal levels and shafts are now disused.
1973 (1:2,500)	The property on site has been demolished.	Significant residential development has occurred to the north and northeast. The school is now denoted as a house (school house) and council yard.
2024 (1:10,000)	No significant change to site from previous edition.	No significant change to site from previous edition.

2.3 Geological Setting

2.3.1 Geology

The 1:10,000 scale British Geological Maps of the area (Sheet SN70SW) was consulted for geology underlying the site. Detailed stratigraphical information is provided in **Table 2.2**.

Table 2.2 Detailed Stratigraphical Information

Period	Group	Formation
Carboniferous	Asturian Substage	Swansea Member Predominantly green grey, lithic arenites (Pennant Sandstone) thin mudstone/siltstone and seat earth interbeds and mainly thin coals.
Carboniferous	Asturian Substage	Hughes Member Green grey, lithic arenites (Pennant Sandstone) thin mudstone/siltstone and seat earth interbeds and mainly thin coals.

No superficial soils are recorded.

The Duffryn Fault, which down-throws to the east, is seen to cross the site. The Coal Authority record the fault following a slightly different route, as illustrated on **Figure 2.2**.

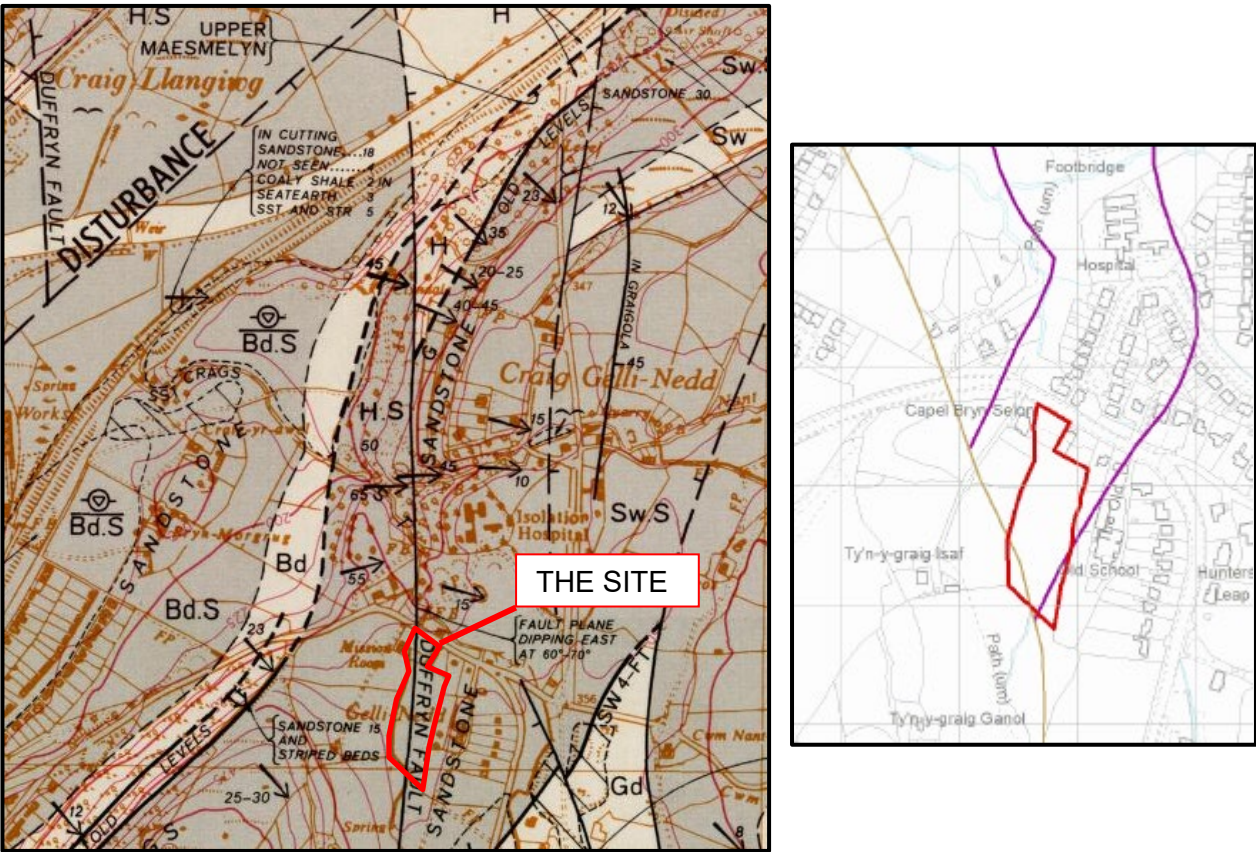


Figure 2.2 The 1:10,000 scale British Geological Map (Sheet SN70SW) & Plan Excerpt From Coal Mining Report

Rocks of the Hughes Member lie west of the fault, and rocks of the Swansea Member lie to the east.

The strata are shown to dip towards the southeast at a minimum inclination of 23 degrees.

The outcrop of the Hughes coal seam and underlying Glyngwilym seam, are recorded approximately 130m to the west. Old levels are denoted along these seam outcrops. These seams may be expected to lie at depth beneath the site.

The Coal Authority also records two coal seams, as shown in **Figure 2.2**. An unnamed seam outcrops beneath the far southeast of the site, and the underlying Swansea No.3 seam lies 36m to the northwest. Reference to the geological map informs that the No.3 Swansea seam is the Graigola coal.

SECTION 3 Coal Mining Data

3.1 The Coal Authority Consultants Coal Mining Report

A Coal Authority Consultants Coal Mining Report was procured for the site. The report is appended in **Annex B** and is summarised in the following subsections.

3.1.1 Past Underground Mining

The Coal Authority record no past mining beneath the site.

There are no spine roadways recorded at shallow depth and the Coal Authority state that no probable unrecorded workings are expected to underlie the site at shallow depth.

3.1.2 Mine Entries

There are no mine entries are recorded in the Coal Mining Report within 100m of the site boundary.

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining at the site.

The Coal Authority has no record of a mine gas emission requiring action within 500m of the site.

3.2 Stratigraphical Sequence Beneath the Site

The site is shown to be underlain by the South Wales Middle Coal Measures. The anticipated stratigraphical sequence beneath the site is illustrated in **Figure 3.1**.

		Thickness	Depth
Head Deposits		Unknown	Unknown
Upper Pennant Measures	Hughes Beds Sandstone	Unknown	Unknown
	Hughes Coal Seam	1.05m with 18cm parting	
	Brithdir Beds	97m	Unknown
	Glyngwilym Coal Seam	48cm	
	Brithdir Beds	Unknown	Unknown

Figure 3.1 Geology and Strata Base below Ground Level – West of the Dyffryn Fault

		Thickness	Depth
Head Deposits		Unknown	Unknown
Upper Pennant Measures	Swansea Beds Sandstone	Unknown	Unknown
	Unnamed Seam	Thin	Shallow (far east of site)
	Swansea Beds Sandstone	Unknown	Unknown
	No.3 Swansea / Graigola Coal Seam	1.4 – 1.8m	18m
	Hughes Beds Sandstone	Unknown	-

Figure 3.2 Geology and Strata Base below Ground Level – East of the Dyffryn Fault

The No.3 Swansea/Graigola coal is noted by the Coal Authority to be of workable thickness.

Based on the seam dip and distance from site quoted by the Coal Authority, the seam may be expected to lie at 18m depth on the north-western corner of the site, deepening towards the southeast.

The geological map records that the Graigola seam has been worked from outcrop north of the site.

3.3 Conclusion

Due to the historical evidence for working of the Graigola seam in the local area, and because this seam is of workable thickness, the presence of unrecorded workings in the seam beneath the site cannot be ruled out.

In order to prevent the collapse of old workings migrating to the surface and forming ‘crown holes’ there should be a rock head to void ratio of 10:1.

Depending on the amount of rockhead cover above any workings the above criteria may not be satisfied.

It is therefore recommended that a physical site investigation be performed on site to establish the geological conditions and presence and thickness of any coal seams and workings.

This should entail the sinking of a number of rotary probeholes across the site

The probeholes should be taken to a depth of 30m into bedrock. Any workings with $\geq 30\text{m}$ rockhead cover are not deemed to present a significant risk from collapse at the surface.

Appropriate permission should be sought from the Coal Authority prior to any site investigation works.

Following investigation, the requirement for any necessary mine stabilisation can be confirmed. If shallow workings are found to exist and insufficient rockhead cover is confirmed, then a probe drilling and grouting exercise will be necessary.

Once all investigatory works have been undertaken then the most suitable foundation solution may be recommended.

3.4 Geoenvironmental Risk

3.4.1 Mine Gas Risk Assessment

This assessment has been completed in accordance with guidance published in CL:AIRE:2021, Good practice for risk assessment for coal mine gas emissions. In the first instance, the risk assessment process requires the screening out of 'potentially at risk sites' utilising the decision support tool for mine gas risk assessment, provided in Figure 13.1 – CL:AIRE:2021. A summary of the decision tool and site outcome is presented in **Table 3.2**.

Table 3.2 Decision Support Tool Summary – Site Specific

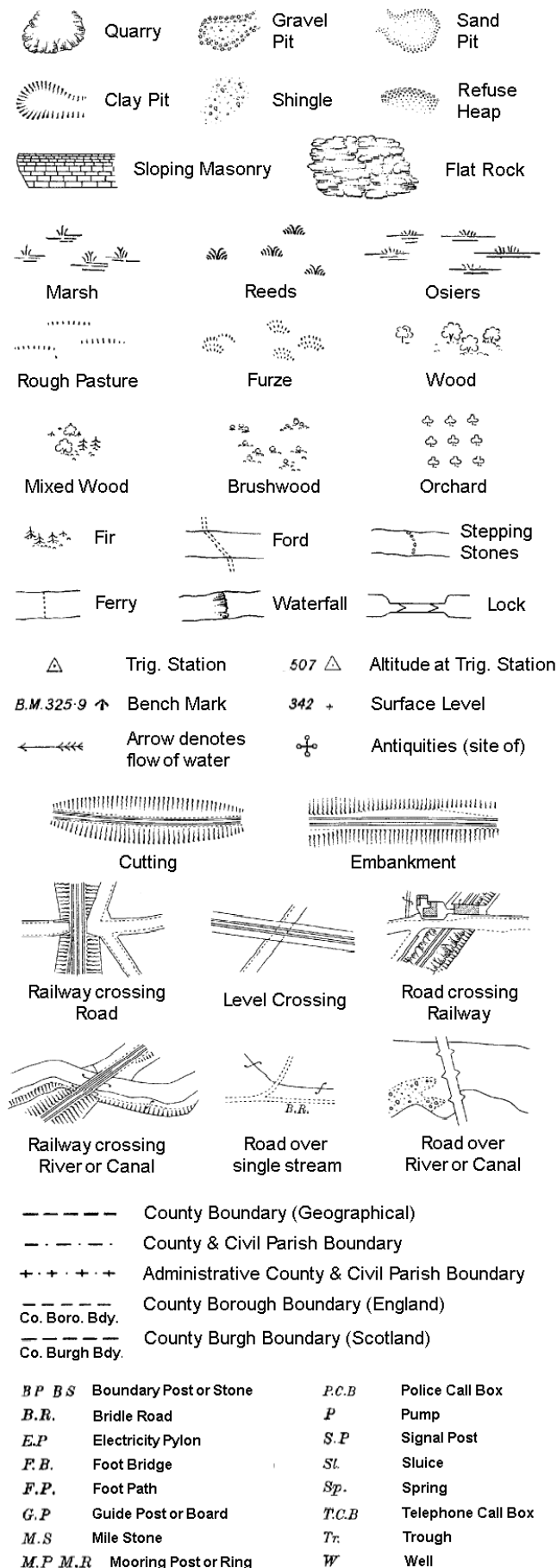
Step	Qualifier Question	Outcome	Comment
1	Is the site within a Coal Authority defined Coal Mining Reporting Area?	Yes	Go to step 2
2	Are all these statements true? Mine entries >50m from site boundary Workings >150m depth No faults or other potential pathways connecting surface to deeper unflooded workings Outside are of past or probable shallow workings on Coal Authority Viewer	Potentially No	Got to step 3
3	Are all these statements true? Workings between 30m and 150m but permanently flooded or covered by 10m+ of low permeable superficial deposits Mine entries > 50m from site boundary Low permeability superficial deposits of sufficient thickness - $<1 \times 10^{-4}$ m/s hydraulic conductivity	Potentially No	Go to step 4
4	Are any of these statements true? Mine entries on site or <20m from site boundary Workings below site <30m depth and unflooded or variable water level Faults or other pathways connecting surface to deeper unflooded workings Within area of past or probable shallow workings on Coal Authority Viewer	Potentially Yes	Potential High Risk Zone if shallow mine workings are present

If shallow mine workings are present then the site would be deemed at risk of mine gas, requiring a detailed mine gas risk assessment to establish whether suitable mitigation measures can be incorporated into the development.

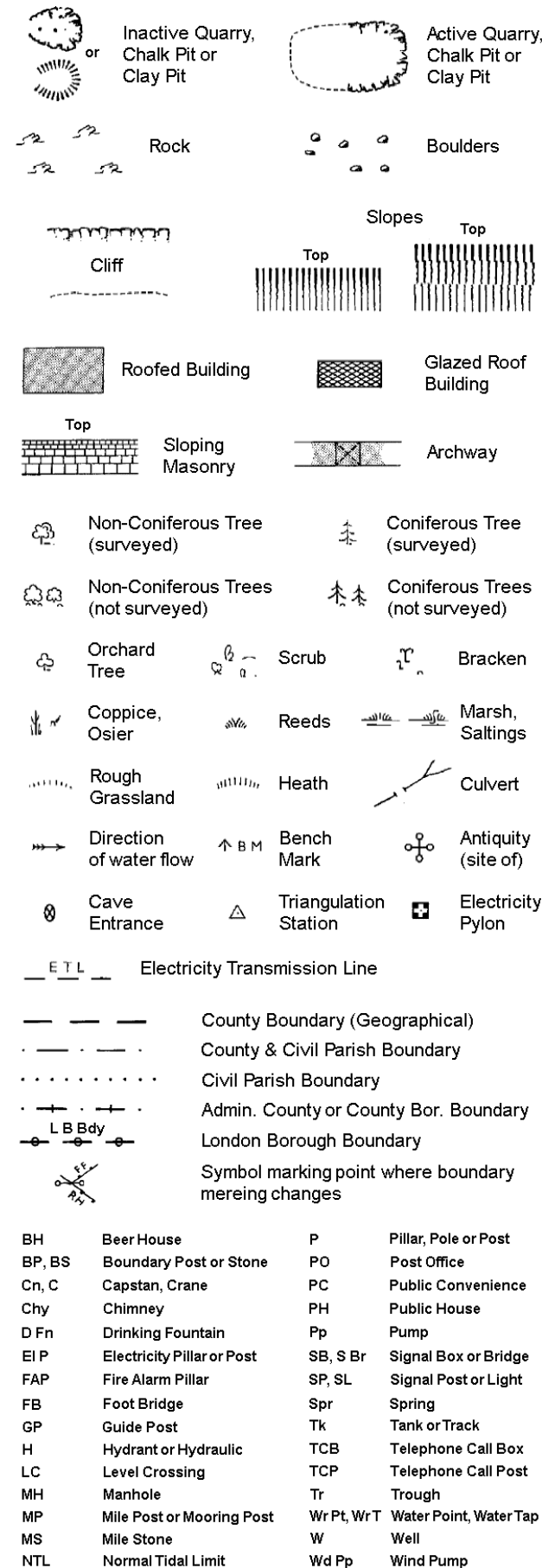
ANNEX A
Historical Maps

Historical Mapping Legends

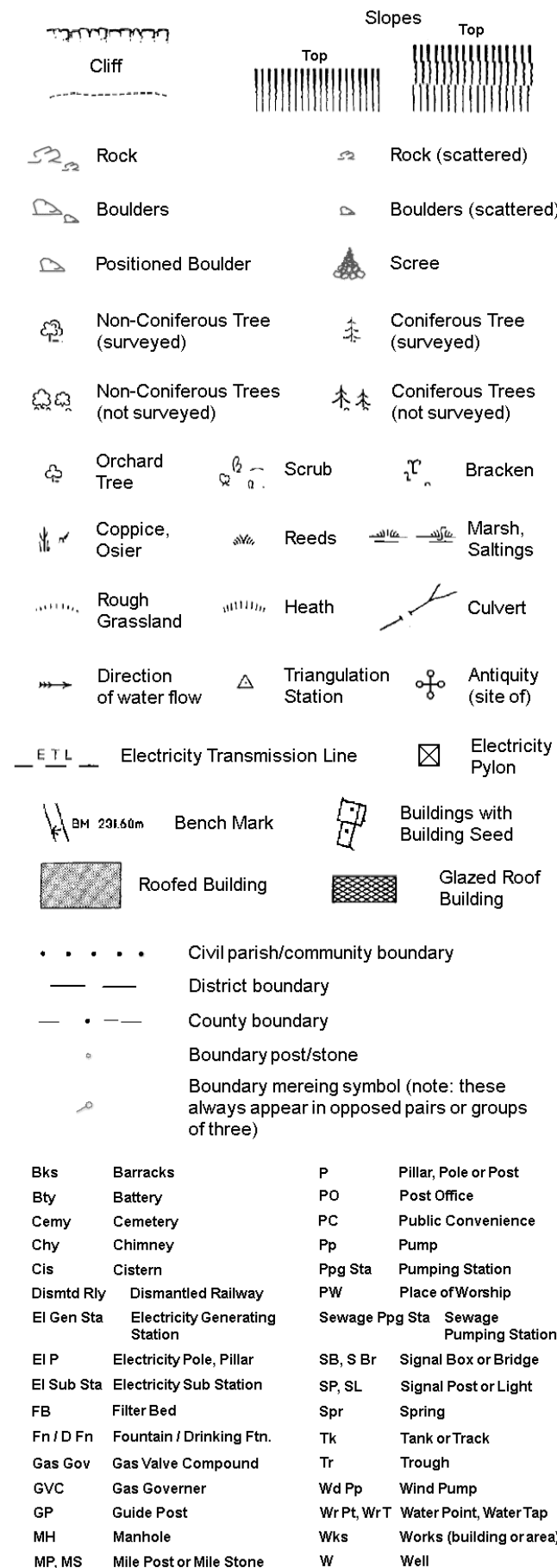
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



Large-Scale National Grid Data 1:2,500 and 1:1,250

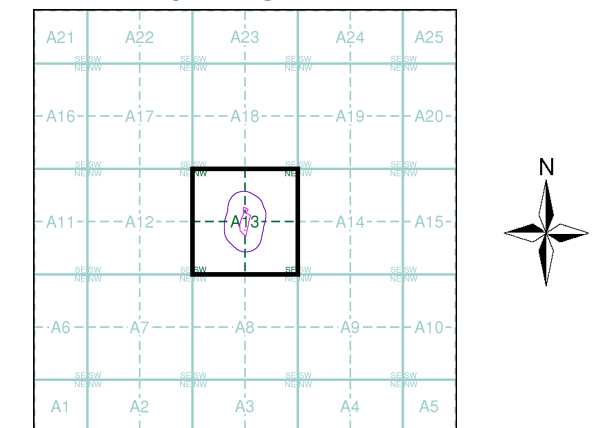


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Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Glamorganshire	1:2,500	1878	2
Glamorganshire	1:2,500	1898	3
Glamorganshire	1:2,500	1918	4
Glamorganshire	1:2,500	1942	5
Ordnance Survey Plan	1:2,500	1964 - 1965	6
Ordnance Survey Plan	1:2,500	1973 - 1974	7
Additional SIMs	1:2,500	1978 - 1989	8
Ordnance Survey Plan	1:2,500	1989	9
Large-Scale National Grid Data	1:2,500	1993	10
Large-Scale National Grid Data	1:2,500	1994	11
Historical Aerial Photography	1:2,500	2000	12

Historical Map - Segment A13



Order Details

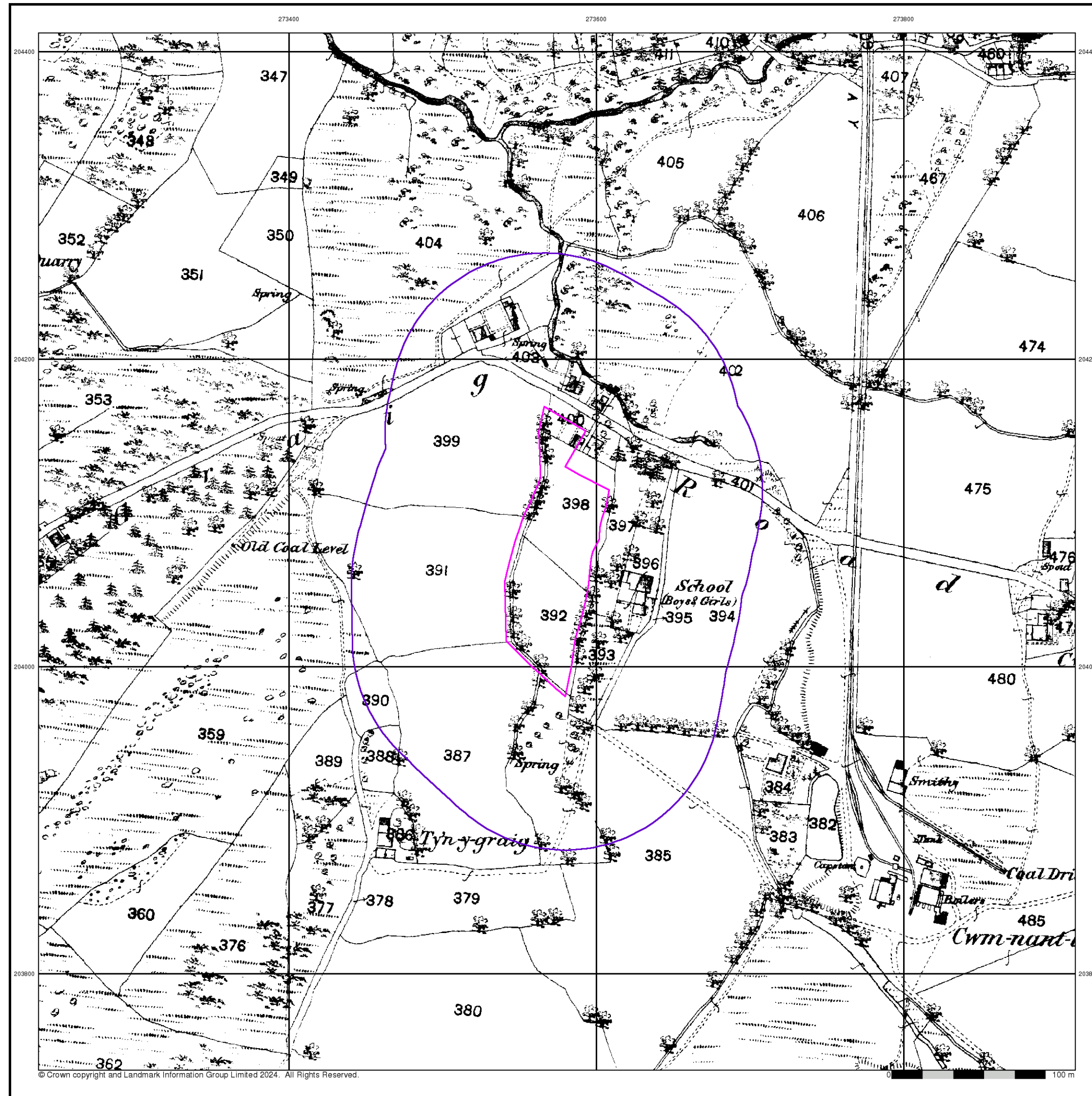
Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 100

Site Details

Site at 273570, 204070

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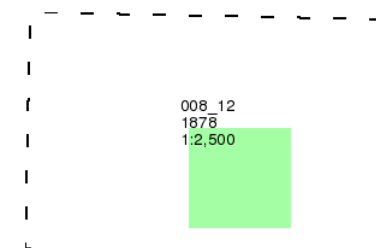
Glamorganshire

Published 1878

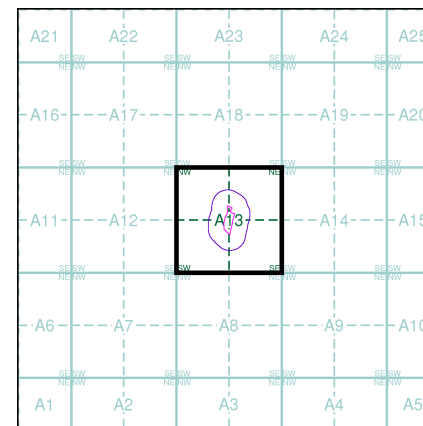
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

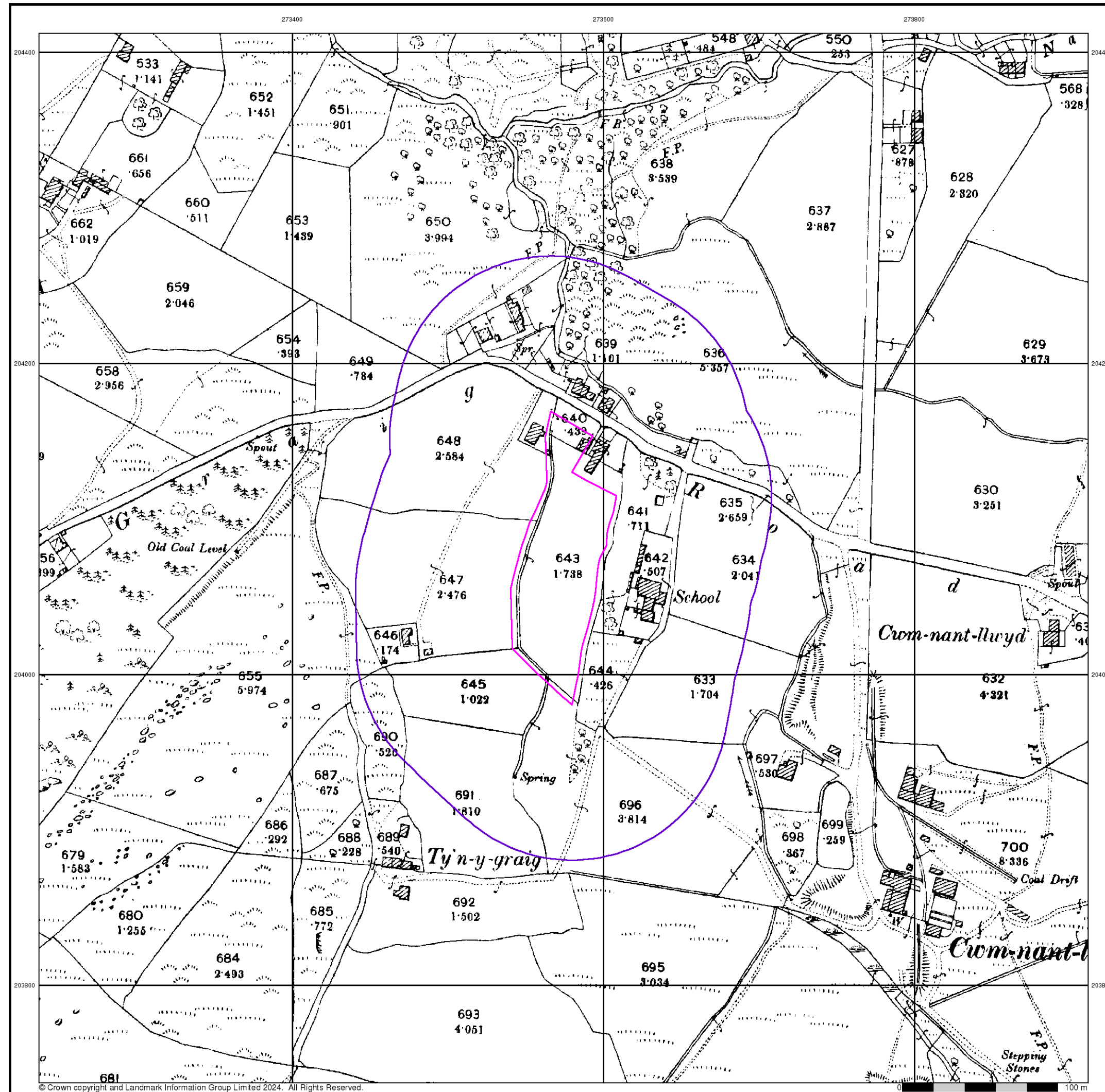
Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
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Site Details

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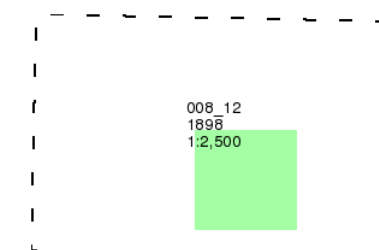
Glamorganshire

Published 1898

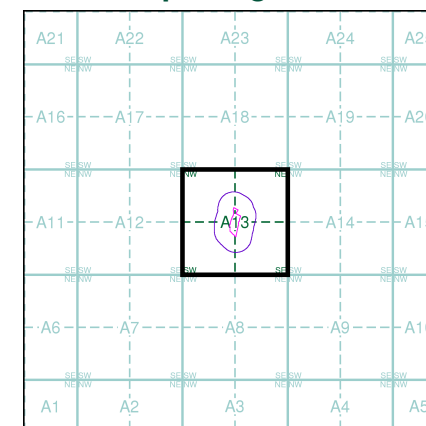
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

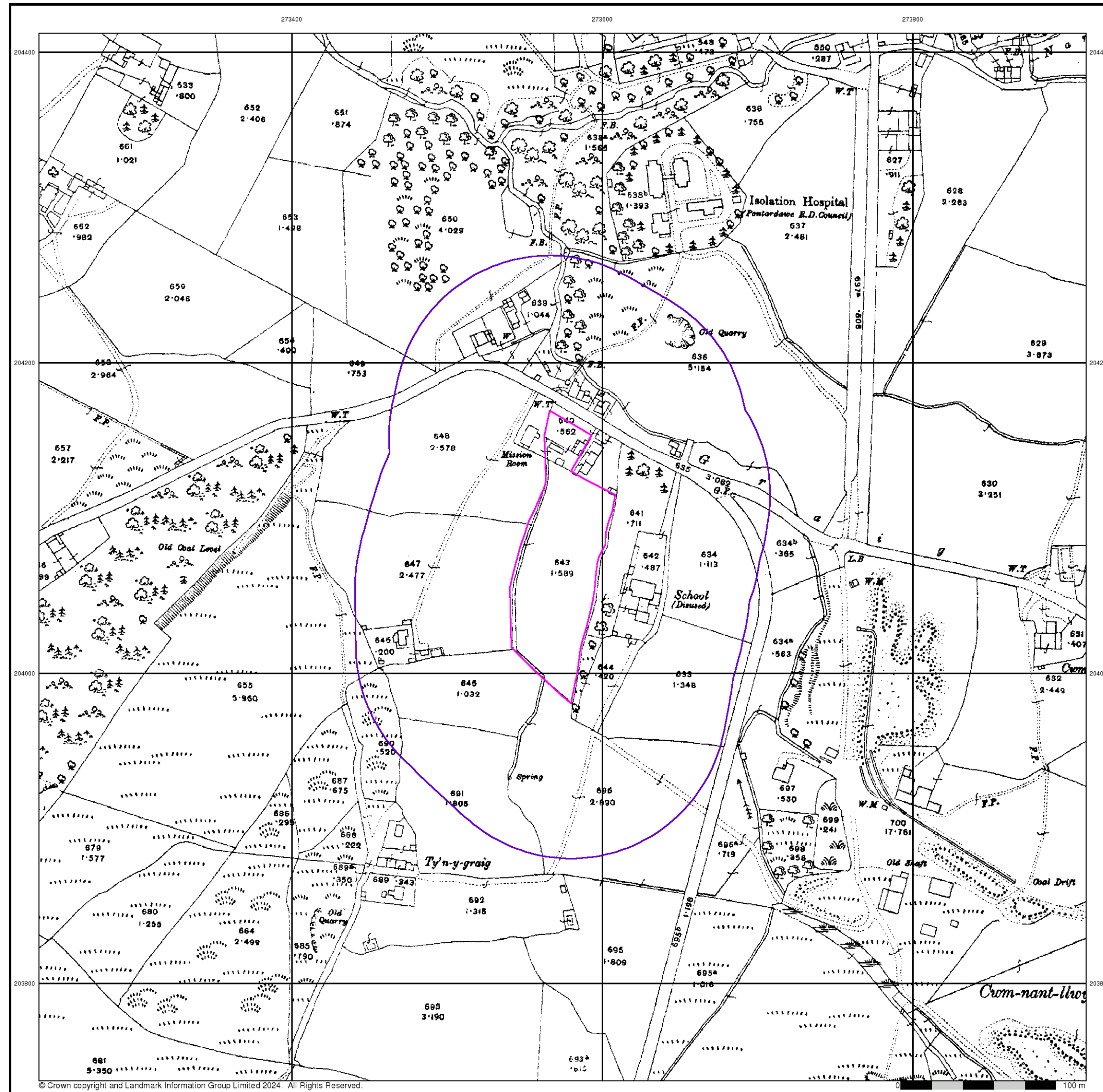
Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 100

Site Details

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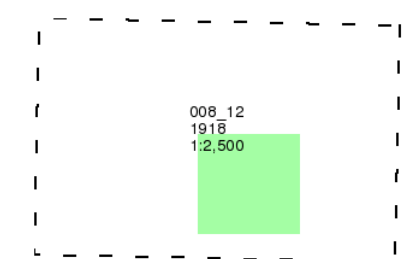
Glamorganshire

Published 1918

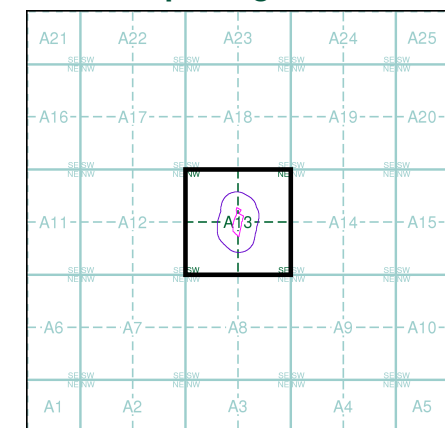
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 100

Site Details

Site at 273570, 204070



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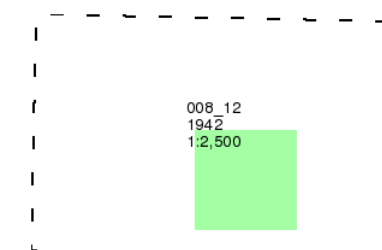
Glamorganshire

Published 1942

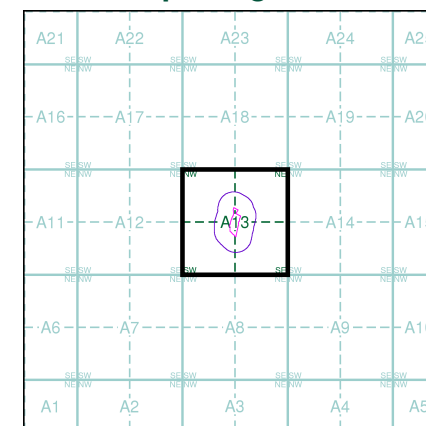
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

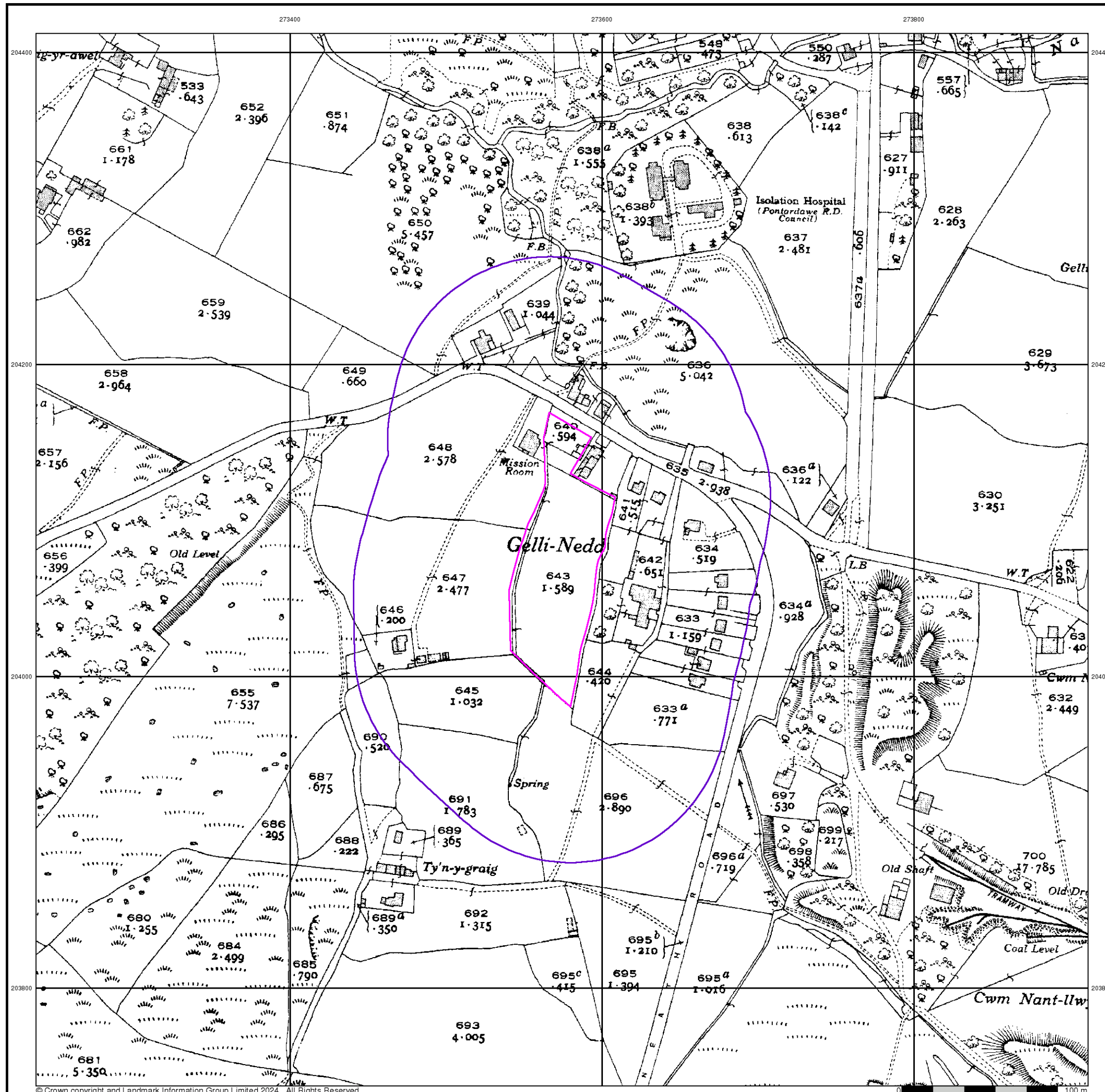
Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 100

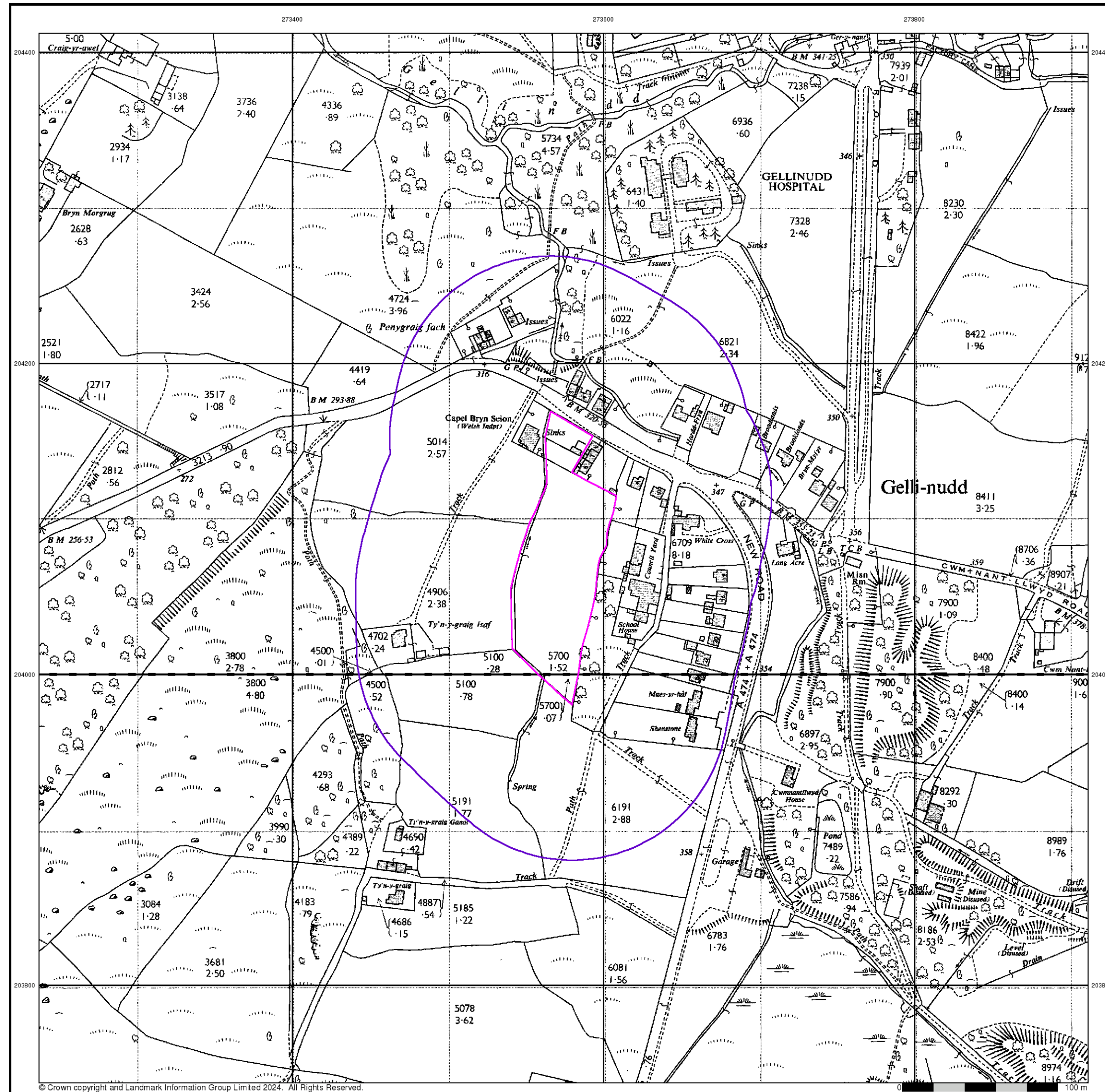
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Ordnance Survey Plan

Published 1964 - 1965

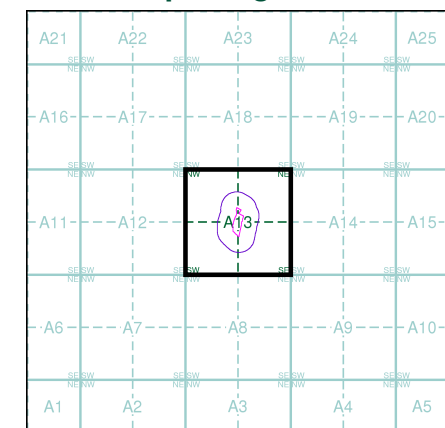
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SN7304
1965
1:2,500
SN7303
1964
1:2,500

Historical Map - Segment A13



Order Details

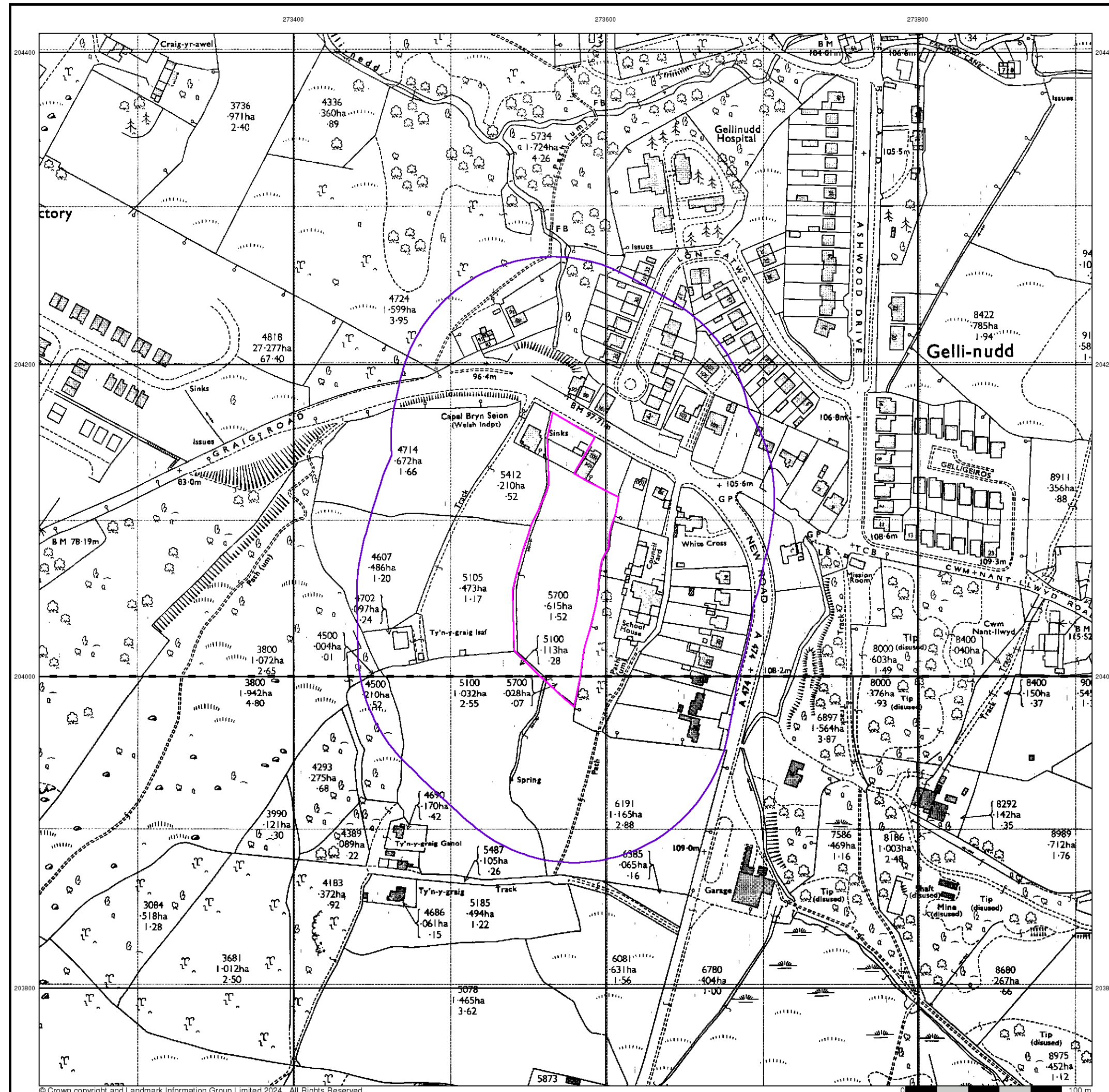
Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 100

Site Details

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Ordnance Survey Plan

Published 1973 - 1974

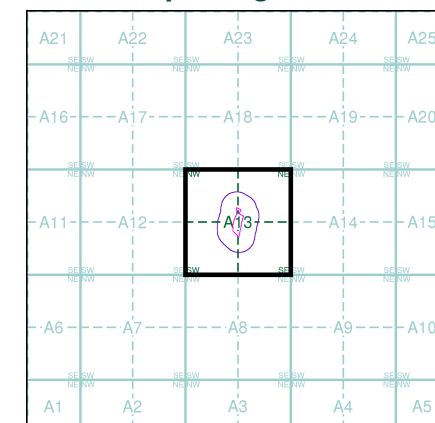
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)

SN7304
1974
1:2,500
SN7303
1973
1:2,500

Historical Map - Segment A13



Order Details

Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 100

Site Details

Site at 273570, 204070



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Additional SIMs

Published 1978 - 1989

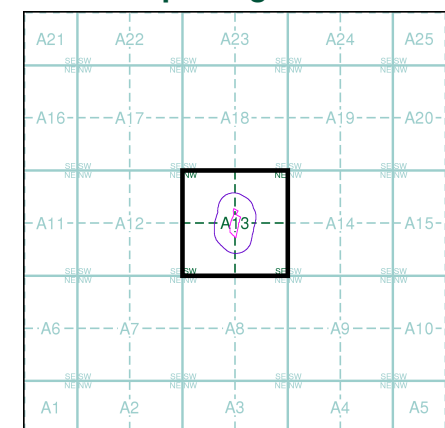
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SN7304	1989	1:2,500
SN7303	1978	1:2,500

Historical Map - Segment A13



Order Details

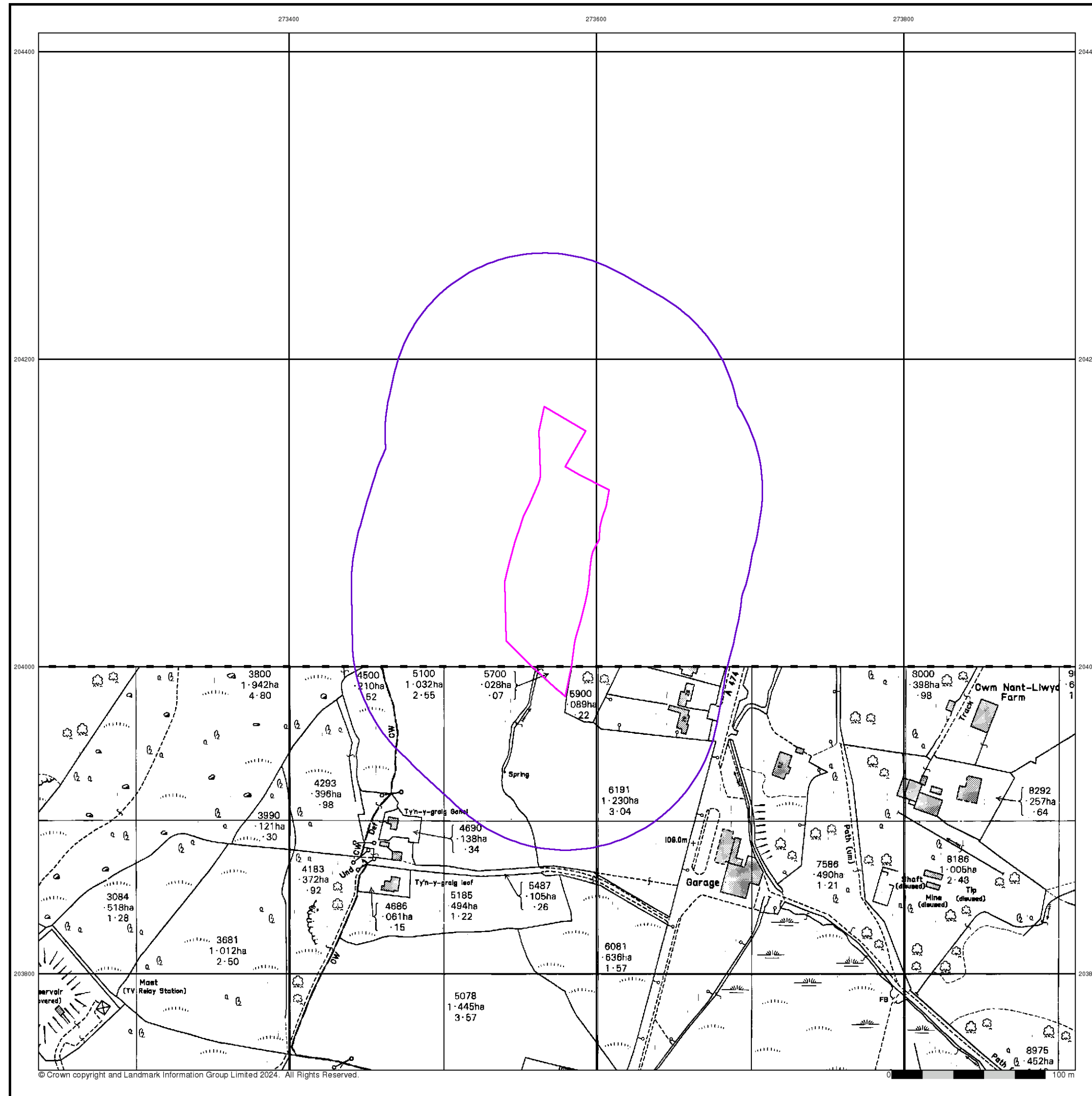
Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 100

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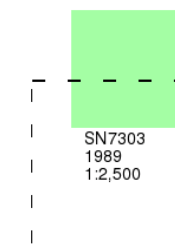
Ordnance Survey Plan

Published 1989

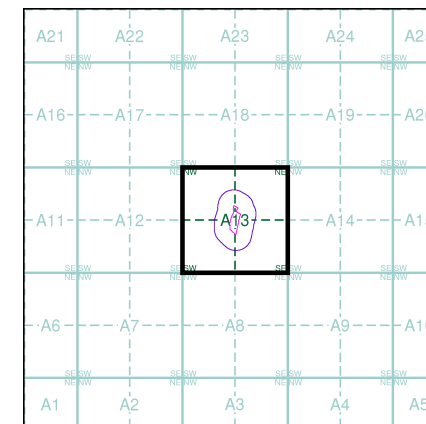
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 100

Site Details

Site at 273570, 204070



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Large-Scale National Grid Data

Published 1993

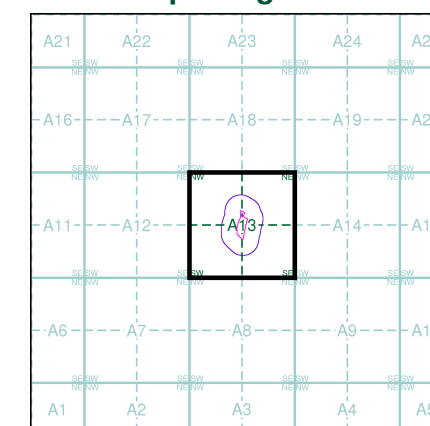
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SN7304	1993	1:2,500
SN7303	1993	1:2,500

Historical Map - Segment A13



Order Details

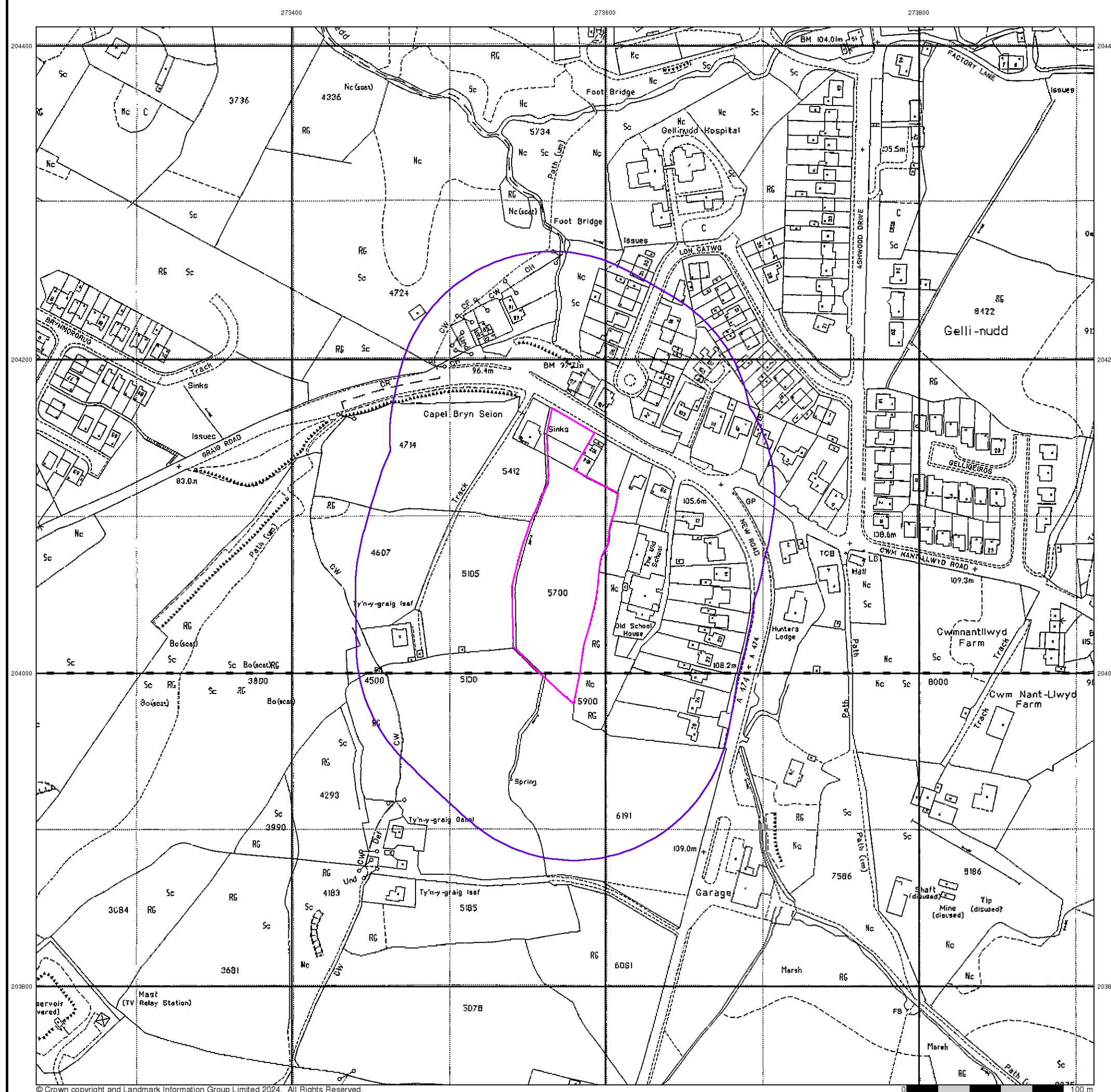
Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 100

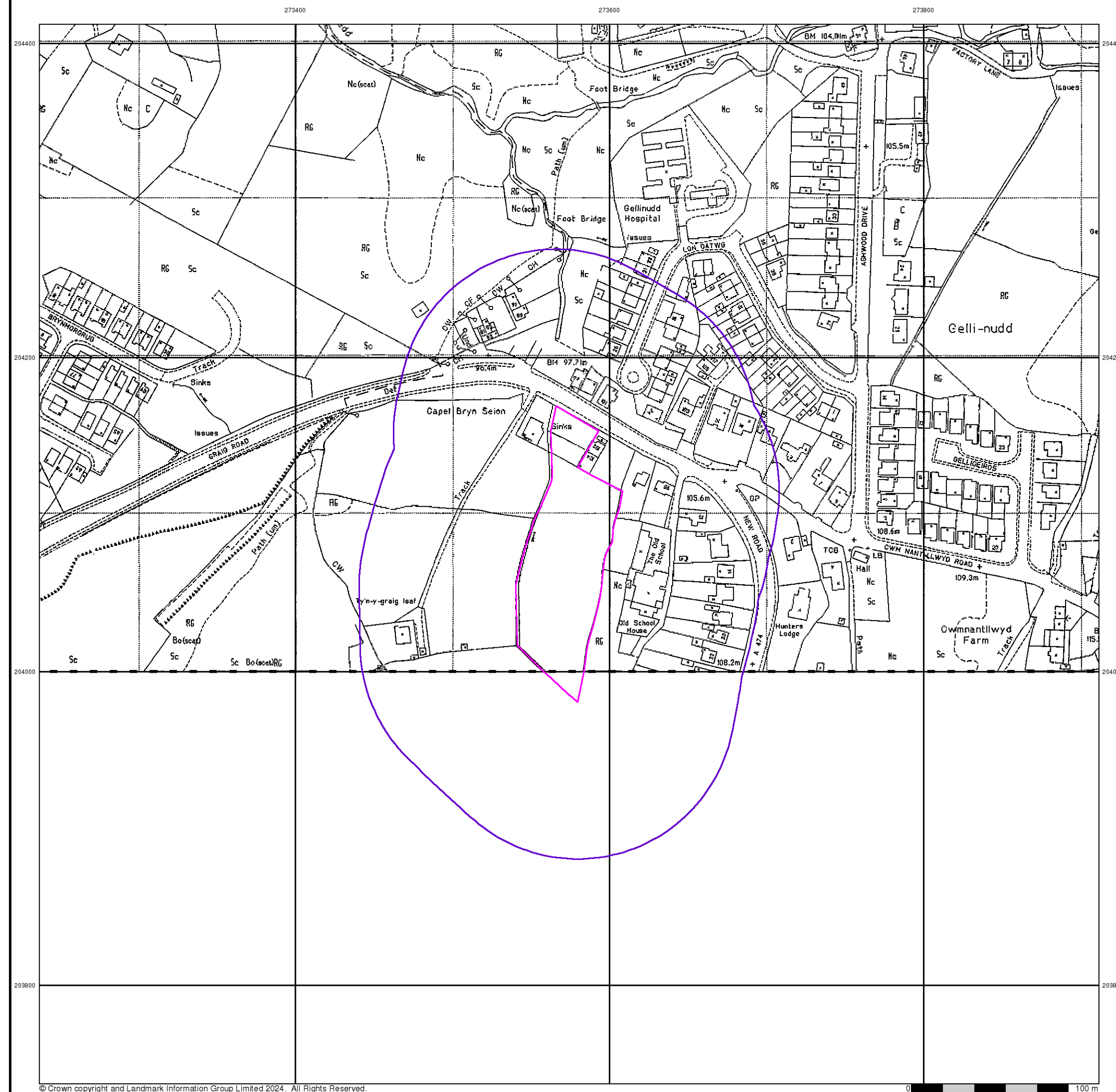
Site Details

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0 100 m



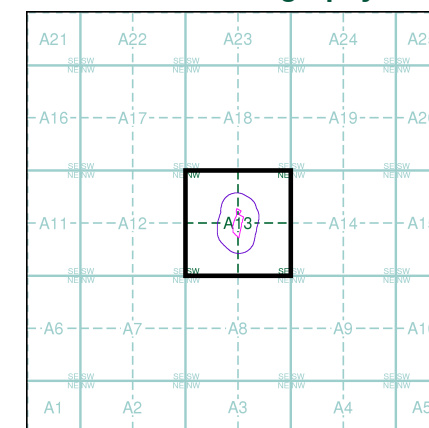
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Historical Aerial Photography

Published 2000

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



Order Details

Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 100

Site Details

Site at 273570, 204070



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Historical Mapping Legends

Ordnance Survey County Series 1:10,560

	Gravel Pit		Sand Pit		Other Pits
	Quarry		Shingle		Orchard
	Osiers		Reeds		Marsh
	Mixed Wood		Deciduous		Brushwood
	Fir		Furze		Rough Pasture
	Arrow denotes flow of water		Trigonometrical Station		
	Site of Antiquities		Bench Mark		
	Pump, Guide Post, Signal Post		Well, Spring, Boundary Post		
	•285 Surface Level				
	Sketched Contour		Instrumental Contour		
	Main Roads		Minor Roads		
	Sunken Road		Raised Road		
	Road over Railway		Railway over River		
	Railway over Road		Level Crossing		
	Road over River or Canal		Road over Stream		
	Road over Stream				
	County Boundary (Geographical)				
	County & Civil Parish Boundary				
	Administrative County & Civil Parish Boundary				
	County Borough Boundary (England)				
	County Burgh Boundary (Scotland)				
	Rural District Boundary				
	Civil Parish Boundary				

Ordnance Survey Plan 1:10,000

	Chalk Pit, Clay Pit or Quarry		Gravel Pit
	Sand Pit		Disused Pit or Quarry
	Refuse or Slag Heap		Lake, Loch or Pond
	Dunes		Boulders
	Coniferous Trees		Non-Coniferous Trees
	Orchard		Scrub
	Bracken		Heath
	Marsh		Reeds
	Building		Glasshouse
	Sloping Masonry		Pylon
	Cutting		Embankment
	Road Under		Road Over
	Level Crossing		Foot Bridge
	Standard Gauge Multiple Track		Standard Gauge Single Track
	Siding, Tramway or Mineral Line		Narrow Gauge
	Geographical County		Administrative County, County Borough or County of City
	Municipal Borough, Urban or Rural District, Burgh or District Council		Borough, Burgh or County Constituency
	Civil Parish		
	BP, BS Boundary Post or Stone		Police Station
	Ch Church		Post Office
	CH Club House		Public Convenience
	F E Sta Fire Engine Station		Public House
	FB Foot Bridge		Signal Box
	Fn Fountain		Spring
	GP Guide Post		Telephone Call Box
	MP Mile Post		Telephone Call Post
	MS Mile Stone		Well

1:10,000 Raster Mapping

	Gravel Pit		Refuse tip or slag heap
	Rock		Rock (scattered)
	Boulders		Boulders (scattered)
	Shingle		Mud
	Sand		Sand Pit
	Slopes		Top of cliff
	General detail		Underground detail
	Overhead detail		Narrow gauge railway
	Multi-track railway		Single track railway
	County boundary (England only)		Civil, parish or community boundary
	District, Unitary, Metropolitan, London Borough boundary		Constituency boundary
	Area of wooded vegetation		Non-coniferous trees
	Non-coniferous trees (scattered)		Coniferous trees
	Coniferous trees (scattered)		Positioned tree
	Orchard		Coppice or Osiers
	Rough Grassland		Heath
	Scrub		Marsh, Salt Marsh or Reeds
	Water feature		Flow arrows
	Mean high water (springs)		Mean low water (springs)
	Telephone line (where shown)		Electricity transmission line (with poles)
	Bench mark (where shown)		Triangulation station
	Point feature (e.g. Guide Post or Mile Stone)		Pylon, flare stack or lighting tower
	Site of (antiquity)		Glasshouse
	General Building		Important Building

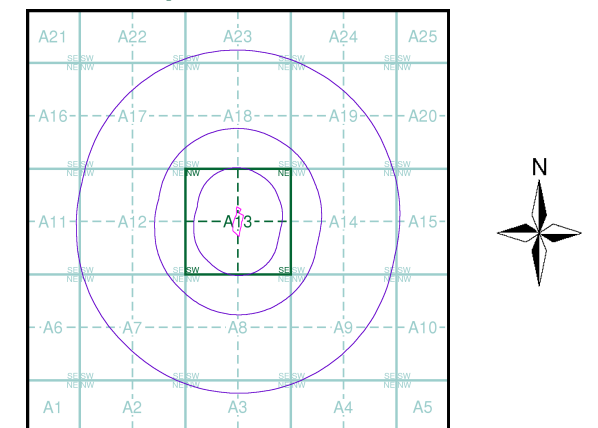


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Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Glamorganshire	1:10,560	1884	3
Glamorganshire	1:10,560	1900	4
Glamorganshire	1:10,560	1921	5
Glamorganshire	1:10,560	1921	6
Glamorganshire	1:10,560	1942 - 1953	7
Glamorganshire	1:10,560	1953	8
Ordnance Survey Plan	1:10,000	1964 - 1965	9
Ordnance Survey Plan	1:10,000	1968	10
Swansea	1:10,000	1976	11
Ordnance Survey Plan	1:10,000	1982	12
Ordnance Survey Plan	1:10,000	1991 - 1992	13
10K Raster Mapping	1:10,000	1999	14
10K Raster Mapping	1:10,000	2006	15
VectorMap Local	1:10,000	2024	16

Historical Map - Slice A



Order Details

Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 1000

Site Details

Site at 273570, 204070

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Russian Military Mapping Legends

1:5,000 and 1:10,000 mapping

a. Not drawn to scale b. Drawn to scale

Government and Administrative Buildings Military and Industrial Buildings

Military and Communication Areas Subway Entrance

Fireproof Building Prominent Fireproof Building

Non-fireproof Building Non-fireproof Building (non-dwelling)

Factory, mill, and flour mill, with chimneys Factory, mill, and flour mill, without chimneys

Power Station, drawn to scale Hydroelectric Power Station

Radio Station, drawn to scale Telephone Station, drawn to scale

Abandoned Open-pit Mine or Quarry Open-pit Salt Mine

Pit Oil Deposit or Well Oil Seepage

Tailings Pile Fuel Storage Tanks Natural Gas Tank

Bench Mark Drill Hole Burial Mound Triangulation Point on Burial Mound

Single-track Railroad Double-track Railroad and Station Building

Coniferous Forest Deciduous Forest Mixed Forest

Lawns Citrus Orchard Wet Ground Scattered Vegetation

243.8 Values for prominent elevations

186.0 Numbers for spot elevations, depth soundings, contour lines, etc.

0.2 Velocity of the current, width of river bed, depth of river

180/12 Fractional terms: length and capacity of bridges; depth of fords and condition of the river bottom; height of forest and the diameter of trees

Russian Alphabet (For reference and phonetic interpretation of map text)

А а (A)	З з (Z)	П п (P)	Ч ч (CH)
Б б (B)	И и (I)	Р р (R)	Ш ш (SH)
В в (V)	Й й (Y)	С с (S)	Щ щ (SHCH)
Г г (G)	К к (K)	Т т (T)	Ъ (-)
Д д (D)	Л л (L)	У у (U)	Ы (Y)
Е е (E)	М м (M)	Ф ф (F)	Ь (')
Ё ё (YO)	Н н (N)	Х х (KH)	Э э (E)
Ж ж (ZH)	О о (O)	Ц ц (TS)	Ю ю (YU or IU)
			Я я (YA or IA)

1:25,000 mapping

a. Not drawn to scale b. Drawn to scale

Government and Administrative Buildings Military and Industrial Buildings

Military and Communication Areas Subway Entrance

Partly Demolished Buildings Demolished Buildings

Built-Up Area with Fireproof Buildings Predominant Built-Up Area with Non-Fireproof Buildings Predominant

Individual Fireproof Building Prominent Industrial Building

Individual Dwelling, Fireproof Ruins of an Individual Dwelling

Factory or Mill Chimney Factory or Mill with Chimney Factory or Mill without Chimney Mine or Open Pit Mine

Operating Shaft or Mine Non-Operating Shaft or Mine Salt Mine Tailings Pile

Pit Stone Quarry Gas Pump or Service Station Fuel Storage or Natural Gas Tank

Oil or Natural Gas Derrick Small Hydroelectric Power Station Power Station Transformer Station

Cemetery Burial Mound (height in metres) Triangulation Point on Burial Mound Triangulation Point

Bench Mark Bench Mark (monumented) Telegraph Office Telephone Station

Radio Station Radio Tower Airfield or Seaplane Base Landing Strip

Telegraph/Telephone Lines Main Highway Highway under Construction Improved Dirt Road (former truck road)

Double-track Railroad with First Class Station Railroad Under Construction

Shore Embankment River or Ditch with Embankment Water Gauge Water Level Mark

Well Water Reservoir or Rain Water Pit Spring Isobath with value

Heavy (Index) Contour Line Contour Line and Value Half Contour Line Spot Elevation Value

Coniferous Deciduous Mixed Scrub

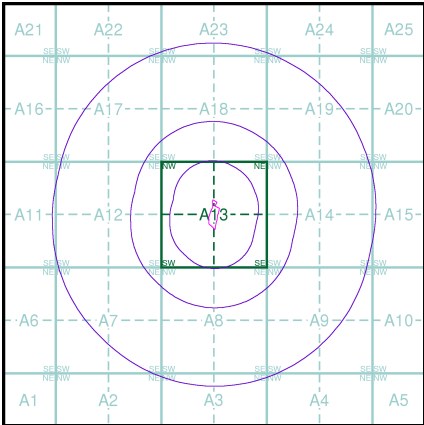
Key to Numbers on Mapping



Geotechnical & Geoenvironmental Specialists
Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Glamorganshire	1:10,560	1884	3
Glamorganshire	1:10,560	1900	4
Glamorganshire	1:10,560	1921	5
Glamorganshire	1:10,560	1921	6
Glamorganshire	1:10,560	1942 - 1953	7
Glamorganshire	1:10,560	1953	8
Ordnance Survey Plan	1:10,000	1964 - 1965	9
Ordnance Survey Plan	1:10,000	1968	10
Swansea	1:10,000	1976	11
Ordnance Survey Plan	1:10,000	1982	12
Ordnance Survey Plan	1:10,000	1991 - 1992	13
10K Raster Mapping	1:10,000	1999	14
10K Raster Mapping	1:10,000	2006	15
VectorMap Local	1:10,000	2024	16

Russian Map - Slice A



Order Details

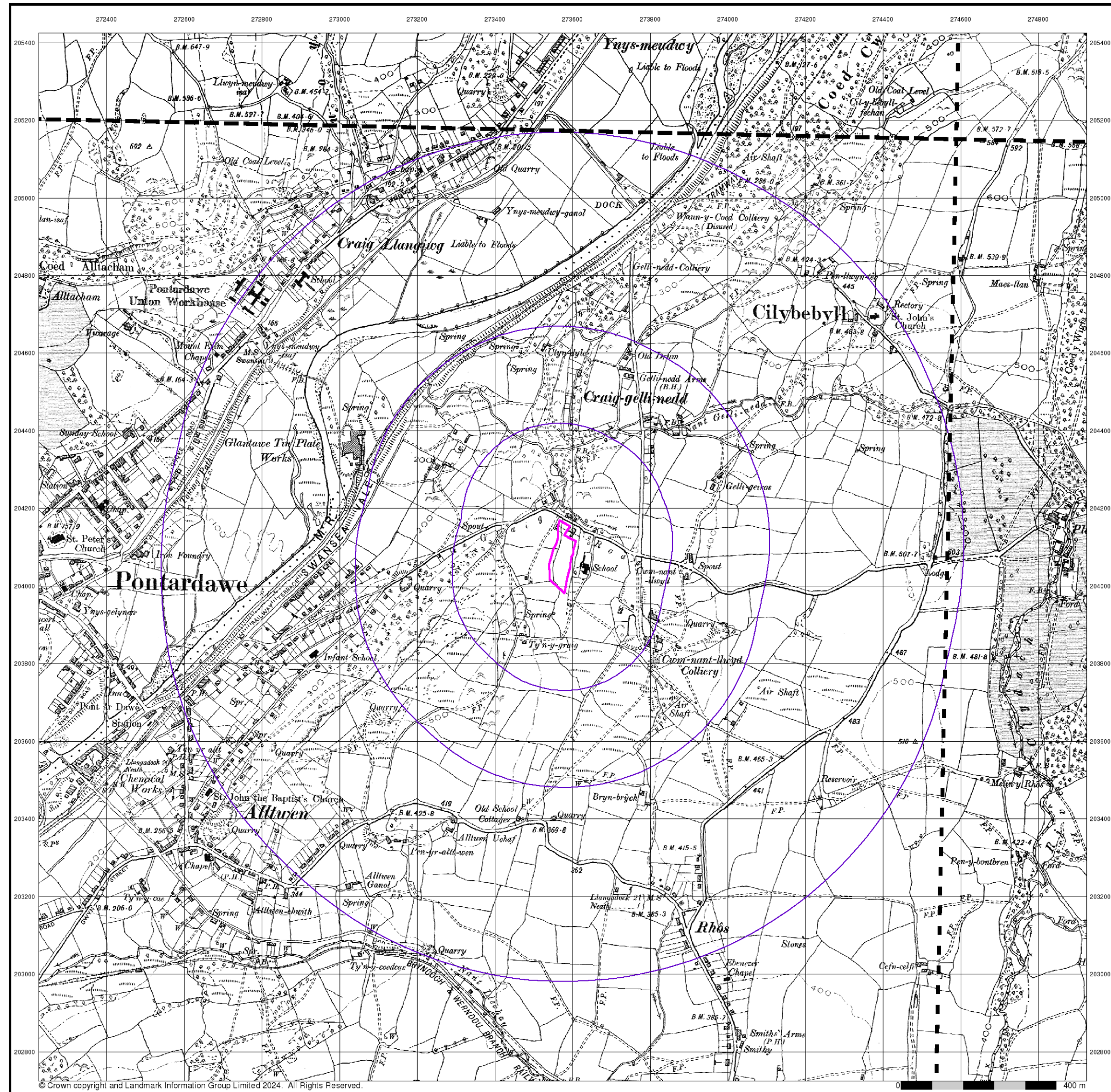
Order Number: 353463109_1_1
Customer Ref: TF-24-364-CA JR
National Grid Reference: 273570, 204080
Slice: A
Site Area (Ha): 0.72
Search Buffer (m): 1000

Site Details

Site at 273570, 204070



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Geotechnical & Geoenvironmental Specialists

Glamorganshire

Published 1900

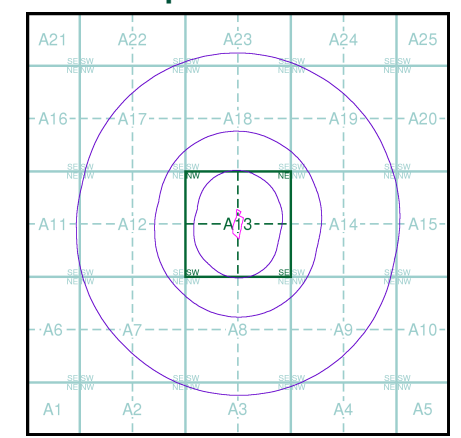
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

008NE 1900 1:10,560	009NW 1900 1:10,560
008SE 1900 1:10,560	009SW 1900 1:10,560

Historical Map - Slice A



Order Details

Order Number: 353463109_1_1
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